

REMARKS

The present application had claims 1-3 and 5-17 pending. Claims 12-15 have been withdrawn from consideration, but not yet canceled. Claims 1, 10 and 11 have been amended herein, and claims 8 and 9 have been canceled. Accordingly, claims 1-3, 5-7, 10, 11, 16, and 17 are presently under examination.

Support for the claim amendment to claim 1 may be found throughout the specification, including in originally-filed claims 8 and 9 and in Figure 4. The remaining amendments simply correct claim dependency. None of the amendments introduce new matter to the application.

In the January 21, 2010 Office Action, the Examiner rejected the pending claims under 35 U.S.C. §§102(c) or 103(a) as anticipated by or rendered obvious by Nanaumi, et al. (US Patent Publication 2003/0049518). The Examiner maintains that the Nanaumi reference discloses all the claim elements in claims 1, 2, 5, 7-8, 10-11 and 16-17 and that the remaining elements of claims 3, 6 and 9, although not disclosed in the reference, would have been obvious to one of ordinary skill.

Applicants disagree with the Examiner's position, but nevertheless, have amended claim 1 to further distinguish the claimed invention from the prior art. Specifically, Applicants have added the limitations that the edges of the first and second substrates and the portion of the front side of the ionically conductive membrane not supported by the first gas distributor substrate are surrounded by a sealing material and that said sealing material impregnates the edge regions of the first and second gas distributor substrates to a depth of at least 1 mm. See claim 1, as presently amended.

Nanaumi does not disclose the features of presently pending claim 1. The edges of both of the GDLs in Nanaumi are not surrounded by the sealing material -- as now

required by amended claim 1. Nor are the edge regions of the GDLs impregnated by any sealing material -- also a requirement of presently pending claim 1.

Nanaumi discloses a frame-shaped sealing member 72 in contact with GDL 34 (see Figure 7 of Nanaumi). However, the actual seal member 90 does not contact the solid polymer electrolyte membrane (see page 6, left column, para. 61).

[0061] Hercinafter, fuel cells having other structures are explained. FIG. 7 is a cross section of a fuel cell 100 using the membrane electrode assembly 70 according to the fifth embodiment of the present invention. In this case, by contacting the frame-shaped sealing member 72 to the seal member 90 closely, it is possible to seal the membrane electrode assembly 70 against the outside thereof. Also, the seal member 90 does not contact the solid polymer electrolyte membrane 22 closely, and a pushing force from the seal member 90 is not applied to the solid polymer electrolyte membrane 22; thus, it is possible to enhance the protection of the solid polymer electrolyte membrane 22 more reliably. Nanaumi, para. 61, *emphasis added*

Accordingly, Nanaumi cannot anticipate claim 1 since it is missing at least two claim elements:

- the edges of both of the GDLs and the portion of the front side of the ionically conductive membrane not supported by the first gas distributor substrate are not surrounded by the sealing material (as required by claim 1), and
- the edge regions of the GDLs are not impregnated by the sealing material to a depth of at least 1 mm (as required by claim 1).

As far as the obviousness rejection under 35 USC §103(a), the Examiner alleges, *inter alia*, that it would have been obvious to a person of ordinary skill in the art to impregnate the edge regions of the gas distributor substrates to a depth of 1mm. A prior art reference is not cited to support the assertion, but rather the Examiner cites as support the skilled artisan's desire to increase the structural integrity of the seal. Based on this

desire, the Examiner alleges that the artisan would have impregnated the substrates with a sealing material to a depth of 1mm.

Applicants disagree with the Examiner's position and maintain that the Examiner has failed to make a *prima facie* case of obviousness. The Examiner has not pointed to any teaching or disclosure in Nanaumi (or in any other reference) that would provide the artisan motivation or suggestion to modify the membrane electrode units of Nanaumi.

Moreover, the basis for the Examiner's assertions that a skilled artisan would have impregnated the substrates with the sealing material to a depth of 1mm "in order to increase structural integrity of the seal" is also unclear. If the Examiner is relying on personal knowledge or on an undisclosed reference for this assertion, Applicants request that the knowledge or reference be made of record so that the basis of the assertions may be examined and possibly challenged.

In addition to failing to disclose or teach all the claim elements of the presently claimed invention, the cited Nanaumi reference also fails to achieve the unexpected benefits of the present invention. As outlined in Applicants' previous responses, the presently claimed design is important for the quality of seal in the MEA. The objective of the present invention is to provide a better design compared to state of the art MEAs characterized by a) removing the danger of short-circuiting and b) gas-tight sealing to prevent hydrogen penetration (see, for example, the specification, page 3, line 24 to page 4, line 10). As set forth in the application, a certain portion of free ionomer membrane is necessary for an improvement of gas-tightness of the MEA and a good sealing (see page 6, line 23-24, of the specification).

These results are surprising and supported by the comparative electrochemical tests determining open cell voltage (OCV) and hydrogen penetration current (HPC) in comparison to the state of the art set forth in the specification (see table 1, page 11). As can be seen in Table 1, the HPC is improved by more than the factor of 4 compared to the state-of the art MEAs. This leads to a significant improvement in fuel cell performance.

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Serial No.: 10/699,158
Filing Date: October 30, 2003
July 21, 2010 Response to January 21, 2010 Office Action
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In light of the amendments and remarks above, Applicants request reconsideration and withdrawal of the rejections under 35 U.S.C. §§102(c) and 103(a) set forth in the January 21, 2010 Office Action and respectfully solicit allowance of the present application.

No fee is deemed necessary in connection with the filing of this amendment, other than the fee for the requested three-month extension of time. If any additional fees are due, or an overpayment has been made, please charge, or credit, our Deposit Account No. 11-0171 for such sum.

If the Examiner has any questions regarding the present application, the Examiner is cordially invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,



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